develop new ones out of depressions in the skin. One is reminded of the experiments of Fontan, in which a hypnotic subject readily sorted with his hands colored wools which it was impossible for him to see, though these are, of course, far too extraordinary to be accepted from a single instance.

Several questions which have been hotly discussed would seem to be definitely disposed of by Graber's experiments. (*a*) It is plainly established that animals have a color sense. Grant Allen affirmed that it is very rarely that animals react to differences of color, which shows, as our author remarks, the danger of investigating nature after a purely speculative fashion. (*b*) Do colors look the same to animals as to us? To those which are sensitive to ultra-violet, and to those, if there are such, which are insensitive to red, they evidently do not; white, and every other color which is not of spectral purity, must look different to them. As regards others, there was never any ground for discussing the question; there is no possibility of answering it one way or the other. (*c*) Magnus and others have said that certain animals which have no cones in the retina must be for that reason insensitive to colors. It is now plain that the color effect must be due not to any particular morphological structure, but to the presence of certain chemical substances decomposable by light. (*d*) The existence of colored flowers and fruits is certainly not essential to the development of a color sense. It is not even true that flower-loving animals have a more highly developed color-sense than others; the flea which infests the dog reacts to much finer color-differences than the bee. (*e*) The theory that the men of Homer's time had any difficulty in distinguishing colors will have received, it is to be hoped, its deathblow.

We have only two criticisms to make upon Graber's work. He does not give sufficient importance to the fact that the choice which his animals exhibit is choice of a *place of abode*, and that they might have different color-preferences for small objects. He does not seem to have offered his animals the choice between green and blue without ultra-violet: with blue with ultra-violet and green, they gave very marked reactions. C. L. F.

Some Observations on the Mental Powers of Spiders. GEORGE W. and ELIZABETH G. PACKHAM. pp. 36. Reprinted from the Journal of Morphology, Vol. I, No. 2, December, 1887.

These entertaining experiments upon the mental powers of spiders extended to the sense of smell, their hearing, maternal emotions, sight, color-sense, feigning death, and their mistakes. The experiments on the sense of smell were conducted as follows. A glass rod dipped in an odorous liquid was held near the insect, and its motions observed. These experiments were checked by offering the clean rod under the same circumstances. The odors used were essential oils, cologne, and other such perfumes. In 220 experiments on a number of species, but three species were found that did not respond. The responses were "by various movements of legs, palpi, and abdomen, by shaking their web, by running away, by seizing the rod and binding it up with web as they would an insect . . . . by approaching the rod with the first legs and palpi held erect." To loud noises most spiders gave no sign, though one, when on the finger, jumped when "bang" was shouted, and erected its head

when whistled at. Many more responded to tuning-forks. At the first approach some kinds dropped downward a distance from their webs, but seemed after a time to learn to disregard the fork; though they soon forgot. Removal of the palpi and several of the legs did not long interfere with their reactions. These tests failed with spiders that make no web; because of a difference in habits, it is suggested. Still it might be queried whether the perception of the impulses of the air by touch, or from the co-vibrations of the web, were not what was really tested, and had something to do with the difference between the web-making spiders and the others. The impulses of the air from a large tuning-fork can be distinctly felt on the hand. The maternal instinct was studied in the readiness with which females of the species that carry their egg-sacks attached to themselves, would reaccept them after they had once been removed. Most failed to remember them for 48 hours, some for 24. A spider of another species, however, resumed the care of her eggs after being away from them and her web for 51 hours. The sense of sight was tested with cocoons also, and led to the very interesting result that spiders that are used to seeing their cocoons, recognize them at a distance of several inches, while those that carry them attached to their own bodies and so know them only by touch, fail to recognize them by sight, even at very short distances, but know them at once by touch. The spiders investigated seemed very partial to red-lighted areas. They were, however, such as "are found during the day, running among dead leaves or hiding under stones or wood." The experiments made are unfortunately not fully conclusive; for the differences of illumination in the different areas, which might be supposed to influence spiders of such habits considerably, were apparently not taken into account, and a negative conclusion as to temperature was drawn from the disinclination of a single specimen, blinded with parafine, to change the places in which he was set down. Feigning of death differed much in different species; 210 experiments on 19 species were made. Most spiders do not instantly become still, nor remain absolutely motionless. They showed nothing of a cataleptic condition, and were not insensitive to pain. Keeping still in one place serves the double purpose of rendering the insect less conspicuous, and keeping it where it can easily find its way back to its web. Running and jumping spiders whose dependence for escape is in their agility, show this instinct poorly developed or not at all. The cocoons of other genera or pith balls could be palmed off on some for their own cocoons (though when a cocoon and a pith ball were presented at once they chose the first), and one even accepted a lead shot covered with web, much to the discredit of her muscle sense.

III.—HYPNOTISM.

Einiges über Suggestion. ERNST JENDRÁSSIK. Neurol. Centralblatt, May 15 and June 1, 1888.

The subject of the experiments described in this paper was a woman of twenty-seven years who had added to a family history of suicide and apoplexy a personal history of convent life, seduction, theft, three years and a half in men's clothing and occupations, jail